

## ABSTRACT OF THE DISCLOSURE

A fiber optical parametric oscillator is formed using photonic crystal fibers, also known as microstructure fibers or holey fibers. The optical parametric oscillator includes only a few meters of microstructure fiber. In one embodiment, the microstructure fiber is disposed between a highly reflective mirror and a diffraction grating in a simple Fabry-Perot configuration wherein the diffraction grating is tuned to reflect a particular wavelength of the signal wave back to the microstructure fiber. In another embodiment, the microstructure fiber is disposed in a ring cavity and the parametric oscillator is synchronously pumped. The parametric oscillator may be implemented with free space optics or use all fiber optic components.